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PARAGUNNELLICHTHYS SEYCHELLENSIS, A NEW GENUS AND SPECIES OF GOBIOID FISH (MICRODESMIDAE) FROM THE WESTERN INDIAN OCEAN

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In connection with a revisionary study of the wormfishes (Microdesmidae) I have had an opportunity to examine a number of interesting recent collections from the western Indian Ocean. Among these is a form which is evidently intermediate between the Indo-Pacific genus *Gunnellichthys* Bleeker and the rather diverse assemblage of eastern Atlantic Ocean and Western Hemisphere species presently included in the nominal genera *Microdesmus* Günther and *Clarkichthys* J. L. B. Smith. The unique features of this fish clearly warrant the erection of a new genus for its accommodation and, since complexities of the systematics of wormfishes will delay completion of the major study, I consider it appropriate to publish its description at this time.

Specimens reported here were obtained during the Seychelles Islands Program of the International Indian Ocean Expedition and have been deposited in the collections of the Academy of Natural Sciences of Philadelphia (ANSP). Head length is measured from tip of lower jaw to base of uppermost pectoral ray; body depth measured at anal fin origin. Caudal fin length is the distance between the rear of the hypural and the tip of the longest ray.

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Paragunnellichthys new genus

Type-species: *Paragunnellichthys seychellensis* new species.

Diagnosis: An elongate, somewhat compressed, gobioid fish of moderate depth, tapering posteriad, depth at caudal peduncle about half that at anal fin origin; dorsal fin single, low, elongate, with flexible anterior spines and with segmented rays behind, first two spines more widely spaced than successors; dorsal fin origin directly above upper angle of gill opening; anal fin long, low, without spines; the two posterior dorsal and anal fin rays approximated or more closely spaced than fellows; caudal fin rounded to subtruncate, free from other median fins and with 15 principal (segmented) rays; pelvic fins inserted slightly but distinctly in advance of pectoral fins; pelvic fins separate to their bases, each with a slender outer spine and two simple rays, the innermost the longer; pectoral fin narrowly rounded, with narrow base and 11 rays. Head moderately long, about 16 percent of standard length (SL); eye lateral, diameter of fleshy orbit about 16–17 percent of head length, distinct, not obscured by a thick covering of skin; snout and lower jaw rounded, not conspicuously narrowed in front; mouth small, upper lip distinct across symphysis; lower jaw deep, fleshy, protruding, includes most of upper jaw and snout tip when mouth is closed; tongue fleshy, narrow, subtruncate or faintly bilobed at tip; gill opening capacious, subtubiform, restricted to pectoral base and peduncle, not continued forward to isthmus; body and much of head with somewhat embedded, non-imbricate cycloid scales; sensory papillae inconspicuous on head and body. Vertebrae total 48–49, caudal elements most numerous; abdominal prezygapophyses low, not distinctly elevated; splint bones above and below the hypural fan; no predorsal interneurals; proximal pterygiophore of 1st dorsal spine reduced, platelike, inserted between 1st and 2nd neural spines; distal pterygiophores begin immediately behind first dorsal segmented ray; no supplementary proximal pterygiophore between last dorsal spine and anteriormost ray; skull poorly ossified and (in radiographs and cleared and stained material) with frontals failing to reach mesethmoid; posttemporals not distinctly elevated above anteriormost vertebrae.

Relationships: This genus is unique among the Microdesmidae in having only two segmented pelvic fin rays and the combination of a free caudal fin with 15 segmented rays, subtubiform gill opening, anterior dorsal fin insertion, non-imbricate scales, low vertebral count and lack of a supplemental proximal pterygiophore. It is similar to *Clarkichthys* and certain species of *Microdesmus* [specifically *M. ionthas* (Jordan and Gilbert) and *M. floridanus* (Longley)] especially in respect to total vertebral counts and general morphology of the gill opening, but it is readily separated from these by the aforementioned combination of characters. The reduced number of segmented caudal fin rays (there are 17 in all genera except *Gunnellichthys*) together with the absence of predorsal interneurals and supplemental proximal pterygiophore are characters common to *Gunnellichthys*. *Paragunnellichthys* appears to be intermediate between *Gunnellichthys* and the *Microdesmus-Clarkichthys* species complex but more closely related to the former.

Etymology: *Para* (Gr. near) + *Gunnellichthys*.

Remarks: Although a number of microdesmid species were originally described as having but one or two segmented pelvic fin rays, all have been subsequently shown to possess either three or four segmented rays. Re-examination of the types of *Microdesmus carri* Gilbert and *M. suttkusi* Gilbert shows that each has three segmented pelvic fin rays and 17 segmented caudal elements rather than two segmented pelvic fin rays and 13 segmented caudals as described (Gilbert, 1966). Whereas the branching of pelvic rays is evidently ontogenetic in *Gunnellichthys* and the rays are consistently simple in other genera, the number of rays is a stable generic character within the Microdesmidae.

Paragunnellichthys seychellensis new species

(Fig. 1)

Holotype: ANSP 103610; 34 mm SL; Mahé Island, Seychelles, NW end of Beau Vallon Bay; from isolated coral outcrop in sand at depth of 20–25 ft; 15 March 1964; Sta. F–114, International Indian Ocean Expedition, Seychelles Islands Program; James E. Böhlke *et al.* coll.

Paratypes: ANSP 103615; 29 and 31 mm SL. ANSP 103656; 33 mm SL, cleared and stained. Other data as for holotype.

Description: Dorsal spines 16–18, dorsal segmented rays 30–31, total dorsal elements 47–48; anal rays 28–30; pectoral rays 11; pelvic fin I–2; principal caudal rays 15; vertebrae $21 + 27\text{–}28 = 48\text{–}49$. See Table 1 for proportional measurements and counts.

Body moderately elongate, depth at anal fin origin averages 8.4 percent of SL, tapering to about half body depth at caudal peduncle; compressed, breadth at anal fin origin 2.5 percent of SL, greatest breadth (5.5 percent of SL in holotype) at opercle; caudal fin broadly rounded to truncate, averages 10.9 percent of SL; head 15.5–16.0 percent of SL, its depth subequal to that of body; interorbital strongly convex, its width ⅔ to ¾ of eye diameter; head tapers evenly to snout tip without a distinct postorbital depression, eye lateral, high on head, its diameter, averaging 16.4 percent of head length, is slightly greater than snout length; lower jaw prominent, extends about ⅔ of eye diameter beyond snout tip, fleshy, includes upper jaw and snout tip when mouth is closed, its lateral depth somewhat greater than eye diameter; lower jaw and snout rounded, not conspicuously narrowed at symphysis; gape short, posterior angle reaches a vertical from front margin of posterior naris, inclined to about 45°; upper lip narrow, continuous across symphysis, concealed laterally by lower jaw and by overhanging snout in front; lower lip fleshy, poorly defined, forming pouchlike lateral expansions

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which receive upper lips and snout when mouth is closed, discontinuous across symphysis where it is interrupted by a subtriangular, fleshy, dorsal continuation of the chin; anterior naris opens anterolaterally through a short tubule located medially on the anterolateral margin of snout; posterior naris dorsolateral over preorbital, with a slightly elevated margin, hardly tubiform; nares apparently of subequal diameter, about 8 in eye; jaws with an outer series of enlarged, separated, caniniform teeth and apparently one inner series of smaller, more closely spaced teeth; at least some teeth rounded or truncate, others pointed, little recurved; tongue narrow, fleshy, truncate or faintly bilobed at tip.

Gill opening (Fig. 2) capacious, originates on pectoral fin base just anterior to insertion of uppermost pectoral ray, margin curves slightly forward and downward to unite with the lower margin of the rather elongate pectoral peduncle at a point about half the peduncle width anterior to the lower pectoral ray insertion; branchiostegal membranes expanded to form a voluminous fold which, in preserved material, overhangs the pectoral peduncle and conceals the ventral termination of the gill opening; gill opening directed posteriad, somewhat tubiform, and not continued to isthmus. Dorsal and anal fins terminate on the short caudal peduncle, free from caudal fin, tips of terminal rays reach to or just past hypural; dorsal fin originates slightly in advance of pectoral base, just above upper angle of gill opening, interspaces of first two spines about 15 percent longer than those which follow, the first spine a little shorter than its fellows; dorsal segmented rays largely simple but some posterior rays may be branched at tips; first anal element simple and segmented, remaining rays also appear to be simple but some may be finely branched at tips; last two dorsal and anal fin rays may be closely approximated at their bases (in 2), if separated they are more closely spaced than preceding rays; caudal fin formula $4 + 2 + 11 + 2 + 4$ (counts of procurrent elements from stained paratype); pectoral fin elongate, narrowly rounded, fin rays simple, 5th and 6th the longest, fin base narrow, peduncle elongate and not completely concealed by opercle and gill membranes; pelvic fins (Fig. 3) separate, inserted distinctly in advance of pectoral fins, below or slightly in advance of dorsal fin origin, with two simple rays, the innermost the longer, and a slender outer spine; anal fin origin beneath interspace between dorsal elements 19 and 20 or 20 and 21.

Head with slightly embedded, generally separated, cycloid scales on nape to posterior margin of interorbital region; scales somewhat closer and more abundant on opercle, cheek, infraorbital, branchiostegal membranes and chest; interorbital region, snout, preorbital region and lower jaw apparently naked; body scales similar, non-imbricate but occasionally touching, covering lateral body and predorsal and ventral surface of abdomen except for a small naked area about anal and genital openings; caudal and paired fins naked but with some scales on pectoral

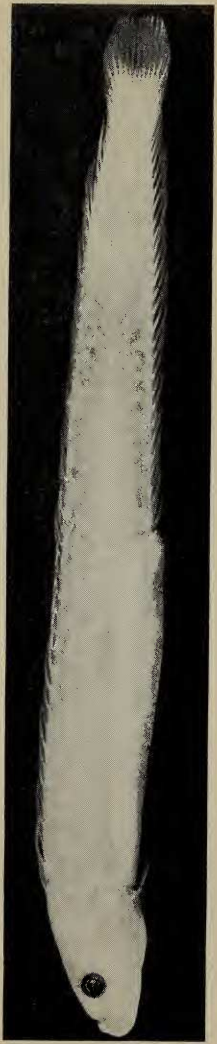

Fig. 1. *Paragunnellichthys seychellensis.* ANSP 103610; holotype; 34 mm SL.

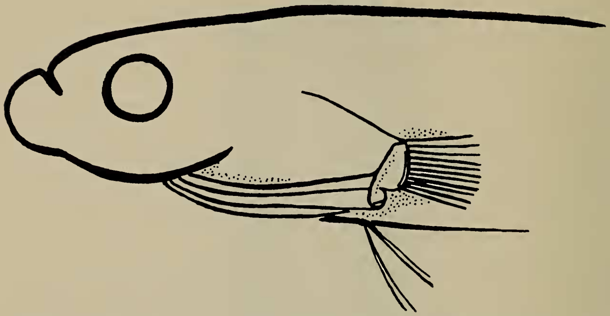

Fig. 2. *Paragunnellichthys seychellensis.* Semi-diagrammatic delineation of gill opening. Anterior dorsal fin elements omitted.

peduncle and continuing into gill opening; body scales inconspicuous but rather large, about 5 in eye diameter.

Dermal sensory papillae inconspicuous, difficult to see; apparently with a transverse interorbital series; a series follows dorsal orbital margin and continues forward onto snout; an indistinct preorbital series margins gape; and there are two separated midlateral rows on the lower jaw parallelling its ventral margin; apparently without prominent rows of papillae on cheek, opercle, infraorbital or body.

No predorsal interneurals. Proximal pterygiophore of 1st dorsal spine (Fig. 4) flattened, subhorizontal, without a descending process, located between 1st and 2nd neural spines; proximal pterygiophore of 2nd spine stronger, chevronlike, with a descending process inserted between 3rd and 4th neural spines and a horizontal process directed anteriad to terminate between 2nd and 3rd neural spines; subsequent proximal pterygiophores progressively more spinelike, with successive reduction of the horizontal process and with each inserted between succeeding

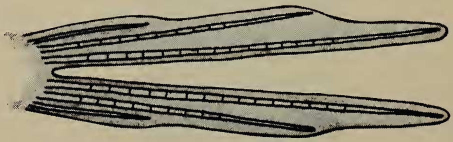

Fig. 3. *Paragunnellichthys seychellensis.* Semi-diagrammatic delineation of pelvic fin.

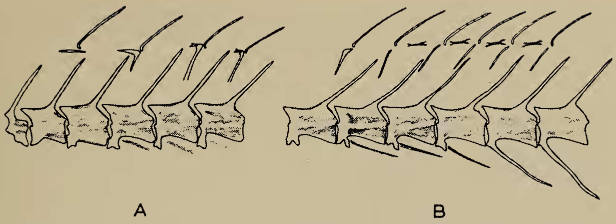

FIG. 4. *Paragunnellichthys seychellensis.* Semi-diagrammatic delineation. A. First five abdominal vertebrae showing dorsal spines and proximal pterygiophores. B. Last four abdominal and first two caudal vertebrae together with last dorsal spine, the five anterior segmented rays, proximal and distal pterygiophores.

neural spines. Distal pterygiophores begin immediately behind the first segmented dorsal ray and after the second anal ray; no supplemental proximal pterygiophore between the last dorsal spine and first ray. Abdominal neural spines strong, slender and pointed, 1st through 3rd somewhat shorter than remainder, which are of subequal length, each located posteriad on centrum; prezygapophyses low, subhorizontal, neither depressed nor dorsally elevated in front; ribs apparently articulate with centra of first two vertebrae, with parapophyses on remaining abdominal vertebrae; ribs gradually increasing in length posteriad to about the 18th vertebra where they are slightly more than twice the vertebral length, subsequent ribs successively shorter; ribs mostly at an attitude of 45°; epipleurals not visible in radiographs nor are they distinct in the cleared specimen; skull (Fig. 5) short, somewhat elevated, frontals poorly ossified and, in both radiographs and stained material, fail to reach mesethmoid; posttemporals curve well forward and are not distinctly elevated above anteriormost vertebrae; pectoral

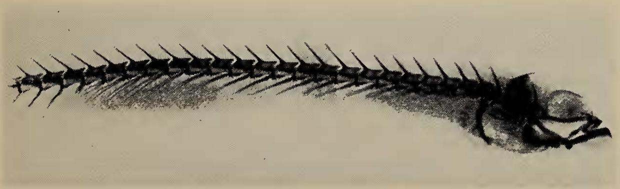

FIG. 5. *Paragunnellichthys seychellensis.* Radiograph of anterior half of ANSP 103610, holotype, showing head, axial skeleton and abdominal ribs.

TABLE 1. Measurements (mm) and counts of *Paragunnellichthys seychellensis.* Figures in parentheses are percentages of standard length or head length.

	ANSP 103610 Holotype	ANSP 103615 Paratype	ANSP 103615 Paratype	ANSP 103656 Paratype	$\bar{X}$%
Standard length	34.4	29.0	30.9	33.2	10.9
Caudal fin length	3.6(10.5)	3.2(11.0)	3.5(11.3)	———	
Least caudal peduncle depth	1.5(4.4)	1.3(4.5)	1.3(4.2)	1.4(4.2)	4.3
Body depth at anal fin origin	3.0(8.7)	2.4(8.3)	2.6(8.4)	2.7(8.1)	8.4
Predorsal length to tip of lower jaw	5.9(17.2)	4.7(16.2)	5.3(17.2)	5.4(16.3)	16.7
Preanal length	18.7(54.4)	15.9(54.8)	16.8(54.4)	17.9(53.9)	54.4
Pectoral fin length	3.3(9.6)	2.7(9.3)	3.2(10.4)	3.2(9.6)	9.7
Pelvic fin length	1.7(4.9)	1.2(4.1)	1.6(5.2)	1.5(4.5)	4.7
Distance from pelvic insertion to anal fin origin	13.3(38.7)	11.4(39.3)	12.0(38.8)	12.9(38.9)	38.9
Head length	5.5(16.0)	4.5(15.5)	4.9(15.9)	5.2(15.7)	15.8
Diameter of fleshy orbit	0.9(16.4)[1]	0.7(15.6)	0.8(16.3)	0.9(17.3)	16.4
Distance from anterior margin of eye to tip of lower jaw	1.6(29.1)	1.3(28.9)	1.3(26.5)	1.5(28.8)	28.3
Snout length	0.8(14.5)	0.5(11.1)	0.7(14.3)	0.8(15.4)	13.8
Postorbital length	2.8(50.9)	2.5(55.6)	2.6(53.1)	2.8(53.8)	53.4
Fleshy interorbital width	0.6(10.9)	0.5(11.1)	0.6(12.2)	———	11.4
Tip of lower jaw to angle of gape	1.5(27.3)	1.1(24.4)	1.2(24.5)	———	25.4
Number of dorsal spines	17	16	18	17	
Number of segmented dorsal rays	31[2]	31	30	30	
Total dorsal elements	48	47	48	47	
Number of anal rays	29	28	29	30	
Anal fin origin beneath interspace between dorsal elements	19/20	20/21	20/21	19/20	

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[1] This and following proportions shown in percent of head length.

[2] The last two rays of dorsal and anal fins are counted separately.

radials 4, branchiostegal rays 5, the innermost remote; mandible strong, with a short, pointed, terminal ventral process.

Ground color, in alcohol, pale yellow-green; without conspicuous markings; body with a midlateral series of scattered, widely spaced, stellate, brown, micromelanophores from pectoral axil to about 15th anal fin ray; one of the paratypes with small submarginal brown blotches over anterior half of anal fin, these are indistinct even under magnification but suggest the presence of an interrupted anal fin stripe; remaining fins immaculate in all specimens; scales without melanistic margination; eye with black iris and iridescent gray pupil.

The specific name refers to the Seychelles Islands which include the island of Mahé, the type locality.

Remarks: Three of the types have enlarged gonads and it is assumed that this is a small species. A partially dissected paratype was found to contain a few, probably less than 200, well-developed ova. These are oval, smooth and each possesses a hyaline tendril; maximum diameters of ten averaged 0.56 mm.

Branching of fin rays is an ontogenetic character in other microdesmids and it is likely that dorsal, anal and pectoral fin rays are branched in larger specimens of *Paragunnellichthys seychellensis.* It is also probable that larger fish have 13 branched caudal rays with a simple ray above and below, a condition presently known only in the genus *Gunnellichthys.*

Literature Cited

Gilbert, C. R. 1966. Two new wormfishes (Family Microdesmidae) from Costa Rica. Copeia 1966 (2): 325–332.